REMARKS

Claims 1, 4-9 and 12-16 are pending in this application. Claims 1, 4-9 and 12-16 are rejected.

In the accompanying Listing of Claims, claims 1, 4, 9 and 12 are amended. Claims 21 and 22 are added. Support for claims 21 and 22 is provided, for example, in paragraph [0013] and tables 3 to 5. No new matter is added.

All of the claims were rejected under 35 U.S.C. § 103 as being unpatentable over Pope (US 3,150,926) in view of WO 98/41475.

Amended claim 1 recites:

> (a) providing calcium hydroxide having at least 92 weight percent solids;
> (b) carbonating the calcium hydroxide with carbon dioxide gas ... to produce a calcium carbonate having ... a solids concentration of at least 92 weight percent; and
> (c) limiting addition of water to a mixture containing the calcium hydroxide and calcium carbonate during the carbonating step, so that the mixture containing the calcium hydroxide, calcium carbonate and water contains at least 92 weight percent solids throughout the carbonating step.

The process of claim 1 converts calcium hydroxide with 92% solids (a flowable powder) to calcium carbonate. Addition of water to the mixture containing the calcium hydroxide, calcium carbonate and water is limited, so that the mixture contains at least 92 weight percent solids throughout the carbonating step. Because the process maintains the high solids content throughout carbonation, the process can be performed by equipment suitable for carbonating and comminuting a flowable powder.

The combined teachings of Pope and WO 98/41475 neither disclose nor suggest the features of claim 1. The Action alleges that Pope provides 98% calcium hydroxide at col. 9, lines 46-51. However, the cited passage of Pope mixes 26.4 pounds/hour of the calcium hydroxide with 14.5 pounds per hour of water. The solids content upon mixing of the $Ca(OH)_2$ and water is calculated as follows:

(26.4 X 0.98)/[(26.4 X 0.98) + 14.5] X 100% = 64% solids Ca(OH)2

Regardless of the solids content of the $CaCO_3$ that may emerge from Pope's apparatus, Pope begins with a mixture having much lower solids content of about 64% during the carbonation step.

Thus, Pope fails to disclose or suggest "limiting addition of water to a mixture containing the calcium hydroxide and calcium carbonate during the carbonating step, so that the mixture containing the calcium hydroxide, calcium carbonate and water contains at least 92 weight percent solids throughout the carbonating step," as required by amended claim 1.

Claim 1 is also amended to recite, "calcium carbonate ... having a solids concentration of at least 92 weight percent.". The Action alleges that Pope discloses production of "calcium carbonate ... having a solids concentration of at least about 92 weight percent," based on Pope's statement that "The carbonate product emitted at exit 40 is in a moist powdery condition although it may contain as much as 10 to 20% by weight of water." The Action alleges, "A moisture content of 10 percent is considered to be at least **about** 92 weight percent solids." [emphasis in original]. Claim 1 is amended to cancel the term, "about". The amendment to claim 1 renders both of the above arguments in the Action moot, because Pope neither discloses nor suggests "calcium carbonate ... having a solids concentration of at least 92 weight percent."

It would not have been obvious to modify the teachings of Pope and WO 98/41475 to limit the addition of water to the mixture containing the $Ca(OH)_2$ and $CaCO_3$ during the carbonating step, so as to maintain a solids content of at least 92 weight percent throughout the carbonating step, as required by amended claim 1, because Pope teaches away from higher solids content above 90 weight percent. Pope discloses that a lowering of the excess water results in excessively high temperatures which have a detrimental effect ("agglomeration or fusing during the exothermic hyrdration and carbonation stages" col. 3, lines 10-11), since there is insufficient water to be vaporized as steam while absorbing the enormous quantity of exothermic heat generated (col. 3, lines 24 to 30). Moreover, Pope discloses that, as the quantity of carbonate produced exceeds much beyond 90 percent, it is accompanied by a corresponding increase in free lime content owing to the lack of complete reaction of carbon dioxide with alkali metal hydroxide (col. 7, lines 68 to 72).

In addition to teaching disadvantages of solids content above 90%, Pope also affirmatively teaches that it is more beneficial to add excess water. ("[I]t is preferred that the excess water content be in the higher portion of the range, namely about 2.5 to 4.0 mols, wherein the carbonation

proceeds more quickly and the carbonate product is discharged in the preferred range of 82 to 87% total solids by weight." col. 3, lines 19-23).

The Supreme Court of the United States has recently addressed the issue of prior art that teaches away from the claimed invention. "[W]hen the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious. *KSR International v. Teleflex Inc.*, 127 S. Ct. 1727, 1740 (2007).

Pope teaches that the **minimum** amount of water to hydrate each mol of lime is described at col. 3, lines 5-6, as being one mol of water per mol of oxide ("One mol of water is of course required to hydrate each mol of the oxide."

Pope's method to make $CaCO_3$ cites water to $Ca(OH)_2$ ratios as follows

Water	g-mole	1.00
Ca(OH)2	g-mole	1.00

Pope's cited ratios produces the following feedstock conditions

	g
Water	18.00
Ca(OH)2	74.00
Total	92.00

	wt%
Water	**19.57**
Ca(OH)2	80.43
Total	100.00

This provides an input mixture of 80.4 % solids and 19.6% water at the beginning of the carbonation process. Regardless of the whether Pope approaches 90% solids at the output of the process, Pope's **minimum** of 19.6% water at the inlet of the fluidized bed ensures that Pope's process does not limit the addition of water so that the mixture containing the calcium hydroxide, calcium carbonate and water contains at least 92 weight percent solids throughout the carbonating step.

The Action argues that it would be obvious to provide calcium hydroxide of about 92 weight percent solids based on the teachings of WO 98/41475, which also fails to disclose or suggest the

claimed solids content of the calcium hydroxide. The Action appears to allege that the deficiencies of both references can be overcome by the more general teachings of WO 98/41475 that calcium hydroxide can have different solids content, and that claim 1 is merely, "Discovery of an optimum value".

Even assuming for purpose of argument that WO 98/41475 teaches varying the solids content, WO 98/41475 still teaches away from the solids content claimed by Applicant. WO 98/41475 states that, "$Ca(OH)_2$ slurry is fed into this state, the solution having a solids content of **<70%, preferably between 5 and 50%.**" [Emphasis added].

Further, as noted above the process of claim 1 can be performed by equipment suitable for carbonating and comminuting a flowable powder. By using the claimed solids content, the process can be performed using different equipment than the fluidized bed required for Pope's process. This is not mere selection of an optimum value of a result effective variable.

Because Pope and WO 98/41475 fail to maintain the high solids content throughout carbonation as claimed by Applicant, the mixture at the input end of both of the references is either a slurry or a paste. Pope and WO 98/41475 require different processing and equipment, because they teach methods for processing slurries and pastes.

Therefore, amended claim 1 is not subject to rejection over Pope in view of WO 98/41475. Withdrawal of the rejection of claim 1 is respectfully requested.

Claims 4-8 and 21 are dependent on claim 1, and should also be patentable, for at least the same reasons.

Amended claim 9 recites:

> (a) providing calcium hydroxide having at least 92 weight percent solids; . . .
>
> (c) limiting addition of water to a mixture containing the calcium hydroxide and calcium carbonate during the carbonating and comminuting steps, so that the mixture containing the calcium hydroxide, calcium carbonate and water contains at least 92 weight percent solids throughout the carbonating and comminuting steps.

The combined teachings of Pope in view of WO 98/41475 fail to disclose or suggest limiting the addition of water during the comminuting step as claimed in amended claim 9. Further, the

references fail to disclose or suggest limiting the addition of water during the carbonating step as claimed in claims 1 and 9, and as discussed above with respect to claim 1.

Further still, the references teach away from using the high solids content of at least 92 weight percent in the mixture containing the calcium hydroxide, calcium carbonate and water, as required by claims 1 and 9. Even though Pope mentions a minimum water content of 10%, both references teach that lower solids contents are preferred. It would not have been obvious to one of ordinary skill in the art to increase the solids content beyond the maximum disclosed by either reference, when both references teach that it would be preferred to reduce the solids content below the maximum.

Therefore, claim 9 would not have been obvious over the combined teachings of Pope in view of WO 98/41475, and the rejection should be withdrawn. Claims 12-16 and 22 are dependent on claim 9, and should be patentable for at least the same reasons as claim 9.

Applicant submits that the pending claims as amended are in condition for allowance. Should Examiner not agree with Applicants' position, then a telephone interview is respectfully requested to discuss any remaining issues and expedite the eventual allowance of the application.

Please charge any fee associated with this paper to Deposit Account No. 04-1679.

Respectfully submitted,

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